Divided Deep-Rolling Roller Head

The invention relates to a deep-rolling roller head with a flat prismatic body constituted by two outer, nearly rectangular lateral surfaces parallel to each other, these being at a distance from each other that is equal to the width of the deep-rolling roller head, in which the lateral surfaces are enclosed all around by rectangular faces, one of which is provided with means to receive a roller cage in which at least one deep rolling roller is mounted so as to be freely rotatable and is supported across from the deep-rolling roller head on a guide roller which is in turn installed in the prismatic body so as to be freely rotatable, whereby the prismatic body is constituted by two half bodies connected to each other in a detachable manner with screws, the width of each half-body being equal to only part of the overall width of the deep-rolling roller head.

The basic structure of deep-rolling roller heads is known e.g. from EP 1 149 663 A1 or from EP 0 839 607 B1 or also from US 6,257,037 B1. In all of these documents a prismatic body, having two flat, nearly rectangular lateral surfaces that are parallel to each other and at a distance from each other can be seen. The circumference of this prismatic body is constituted by rectangular faces with interruptions or openings. One of the faces is intended to receive a roller cage in which the tools, i.e. the deep-rolling rollers are installed in a freely rotatable manner. The deep-rolling rollers bear on a guide roller towards the housing of the deep-rolling roller head, said guide roller being in turn mounted in the housing so as to be freely rotatable. On the underside, i.e. on the side towards the production piece, the roller cages are provided with grooves in which tongues

are engaged, these tongues protruding from L-shaped holders attached by means of screws to the faces of the deep-rolling roller head. This describes the basic structure of a deep-rolling roller head.

From a company brochure of the US company Lonero Engineering Co., Inc. which bears no date, a deep-rolling roller head is known and designated a "Twist Tool". In this known embodiment the body of the deep-rolling roller head was divided longitudinally in the center and parallel to the lateral surfaces. Thereby two prismatic bodies were produced that can be swiveled relative to each other around the central axis which is at the same time the axis of rotation of the guide roller. The swiveling angle is small and the two prismatic half-bodies are held together by means of screws having heads that are countersunk in oval, curved slits. In this manner a kind of bayonet closure is produced by means of which the two prismatic half-bodies can be locked together when the deep-rolling rollers have reached their working position. The two prismatic half-bodies can also be separated from each other by means of the bayonet closure, so that the guide roller lies freely in the interior of the deep-rolling roller head. The company brochure indicates that one of the advantages of the new design consists in the fact that quicker maintenance and assembly are made possible. Thus the replacement of the roller cages and of the deep-rolling rollers should be possible in a matter of seconds. In addition, precise adjustment of the deep-rolling rollers is achieved.

It is however a disadvantage of the known design that the roller cages, previously in one piece, must now also be divided. Each element of a divided roller cage must be attached

with its own screw to the respective prismatic half-body. Four screws in all are therefore required to attach the holder of the deep-rolling rollers, i.e. of the deep-rolling roller cages. The dividing of the roller cages has also a resulted in a more rapid wear and even in breakage of the divided roller cages.

The company brochure shows also a one-piece roller cage such as previously known as another embodiment. This one-piece deep-rolling roller cage must be attached to the respective prismatic half-body by means of two screws. This embodiment also reverses the advantages of the bayonet closure because the two prismatic half-bodies of the deep-rolling roller head must first be moved into their closing position before the roller cages can be installed and attached to them.

For these reasons it is the object of the present invention to continue using the known and proven roller cages in one-piece form and at the same time to use the advantages of a design of the divided deep-rolling roller head into two prismatic half-bodies. A weakening of the deep-rolling roller cages by dividing or because of additional bores is to be avoided especially. Furthermore the deep-rolling roller head is to be safe in operation and adjustable by the operator without any special conditions. At the same time the new tool is to be economical.

The object of the invention is attained by two different embodiments. In one embodiment the two prismatic half-bodies of the deep-rolling roller head are connected to each other articulatedly via an articulation along the face that is across from the face provided to

receive the roller cage. According to this embodiment the two prismatic half bodies are simply detached from each other by opening and are connected again to the deep-rolling roller head by closing. By detaching the two half bodies from each other the guide roller is freed and can be cleaned or renewed. The two prismatic half bodies are connected to each other by means of screws at a location across from the articulation. The roller cage remains undivided and, as is known, is inserted into an opening in the face of the prismatic body where it is held by shackles which can in turn be screwed to each of the prismatic half-bodies.

According to a second embodiment the prismatic body of the deep-rolling roller head is divided along a division joint into two half bodies extending at a distance from the forward surface provided for the installation of the roller cage and which is parallel to it. Hereby an opening design is also possible by attaching an articulation at one of the two faces adjoining the face provided for the installation of the roller cage. Opening is effected in the same manner as the opening of a lighter cap. It is a special advantage of this embodiment that the fastening screw for the two half bodies can be used at the same time to hold the shackle which engages in turn the previously described groove of the roller cage.

Finally according to a third embodiment no articulation is used. Instead, the division joint between the two half bodies has openings in one of the partial bodies into which protrusions on the other half body enter. The attachment of the two half bodies is by

means of through-going screws which can in turn be used to hold the shackle that engages the roller cage. Here as also in the previously described embodiment the division joint runs through the center of the prismatic body constituting the deep-rolling roller head. The division joint runs through the center of the axis of rotation of the guide roller.

The invention is described in further detail below through three examples of embodiments.

Each of the Figs. 1, 2 and 3 shows a different embodiment of the deep-rolling roller head in perspective and not to scale.

The body of the deep-rolling roller head 1 of Fig. 1 is constituted by the two prismatic half bodies 2 and 3. The two half bodies 2 and 3 are held together by an articulation 4 located on the forward surface 5 across from the forward surface 6 provided for the installation of the roller cages 7 and 8. The two half bodies 2 and 3 are opened and closed in the direction of arrows 9 and 10. In their closed position the two half bodies 2 and 3 are connected to each other via screws 11 and 12. The circle 13 in the center of the lateral surface 46 of the half body 2 indicates the hub of the guide roller [not shown] over which the guide roller is supported in the deep-rolling roller head 1 so as to be freely rotatable. An arrangement corresponding to the hub 13 is also located in the half body 3.

The two roller cages 7 and 8 are held by shackles 14 and 15 on the forward surface 5

and are screwed by screws 16 and 17 respectively to one of the two half bodies 2 and 3. Two deep rolling rollers 18 and 19 are supported in the roller cages 7 and 8 so as to be freely rotatable.

The deep rolling roller head 20 of Fig. 2 is constituted by the two prismatic half bodies 21 and 22 which are connected to each other articulatedly by means of an articulation 23 extending across the face 24 adjoining the face 25 provided for the installation of the two roller cages 7 and 8 and of the deep rolling rollers 18 and 19.

The two prismatic half bodies 21 and 22 have the overall width 26 of the deep rolling roller head 20. The two half bodies 21 and 22 are divided along a division joint 27 running through the center of the lateral surface 28 of the prismatic deep rolling roller head 20 and including also the rotational center 29 of the hub 13 of the guide roller [not shown].

In the present case the axis of rotation 30 of the articulation 23 is located slightly below the division joint 27. It may however also be located slightly above this division joint. Here too the deep-rolling roller head is opened by swiveling the two half bodies 21 and 22 in the direction of arrow 31. The lock is constituted by a screw 32 that is provided at the same time to hold a shackle 33 entering the roller cage 8. The roller cage7 however is held by a shackle 34 that is attached by means of a screw 35 to the half body 21. The deep rolling roller head 20 is opened and closed as shown in Fig. 2 in a similar manner as the opening and closing of the cap of a lighter.

The deep rolling roller head 36 of Fig. 3 consists of two prismatic half bodies 37 and 38, having the overall width 26 of the deep rolling roller head 36. The deep rolling roller head 36 is divided along a division joint 39. In the present case the division joint 39 runs again through the \lateral surface 28 of the prismatic deep rolling roller head 36 and also through the center of rotation 29 of the hub 13 of the guide roller [not shown].

The half body 37 is held e.g. on projecting parts 40 of the half body 38 corresponding to recesses 41 in the half body 37. The two half bodies 37 and 38 are attached by means of go-through screws 42 and 43 which in turn hold the shackles 33 and 34 in order to attach the two roller cages 7 and 8. To open the deep rolling roller head 36 , the two go-through screws 42 and 43 are loosened and the two half bodies 37 and 38 are lifted away from each other in the direction of the arrow 44.

As shown in Fig. 3, the division joint 39 is located at one half of the height 45 of the prismatic deep rolling roller head 36. The division joint 39 may however also be located below or above the half height 45 if the construction conditions require it. In the same manner, it is possible to use screws [not shown] other than the go-through screws 42 and 43 by means of which the shackles 33 and 34 are attached to the half body 37.

1 Deep-rolling roller head

2 Half body

3 Half body

4 Articulation

5 Forward surface

6 Forward surface

7 Roller cage

8 Roller cage

9 Arrow

10 Arrow

11 Screw

12 Screw

13 Hub

14 Shackle

15 Shackle

16 Screw

17 Screw

18 Deep rolling roller

19 Deep rolling roller

20 Deep rolling roller head

21 Half body

22 Half body

23 Articulation

24 Face

25 Face

26 Width

27 Dividing joint

28 Lateral surface

29 Center of rotation

30 Axis of rotation

31 Arrow (opening)

32 Screw

33 Shackle

34 shackle

35 Screw

36 Deep rolling roller head

37 Half body

38 Half body

39 Dividing joint

40 Projecting part

41 Recess

42 Passage screw

43 Passage screw

44 Arrow

45 Half height

46 Lateral surface